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## Cooling data centers with outside air gets the go-ahead

By Mark Fontecchio, News Writer  
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Using air-side economizers to cool the data center can save money and, if done correctly, won't ruin IT equipment, according to new research from the Lawrence Berkley National Laboratory.

The study was sponsored by Northern California utility company Pacific Gas and Electric Co. (PG&E), which offers rebates to customers who install economizers that use outside air to cool their data centers. Air-side economizers typically include a sensor and filter that allow outside air to enter the data center when conditions, such as temperature and humidity, are appropriate.

### The contamination conundrum

The worry is that outside contaminants will land on electronics and cause them to wear out or shut down.

"The pollutant of primary concern, when introducing particulate matter to the data center environment, is fine particulate matter that could cause conductor bridging," the Lawrence Berkley report said. "Outdoor concentrations of fine particulate matter in California are relatively high compared to other areas within the U.S. and can be greater than the indoor limits established by [ASHRAE](#)."

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Lawrence Berkley found that compounds called hygroscopic salts, when combined with high humidity, can cause equipment to shut down. But William Tschudi, a project manager in Lawrence Berkeley's environment energy technologies division and one of the study's authors, said filtration systems in most data centers do just fine in keeping contaminants out.

According to the report: "The results from this study indicate that IT equipment reliability degradation due to outdoor contamination appears to be a poor justification for not using economizers in data centers."

In Winnipeg, Manitoba, Timothy Happychuk, regional director for Quebecor, a Canadian media company, said his data center is cooled entirely by outside air for about two and a half months of every year. During other times, the air-side economizers are used part of the time. In all, he estimated that about 65% of cooling for the data center comes from outside air.

During weeks when it's minus 30 degrees Celsius -- that's minus 22 degrees Fahrenheit -- he actually has to warm the air before it goes off to cool data center equipment. Fortunately, they've got the hot-air exhaust from the servers to do that work for them.

"We engaged local companies so we could bring outdoor ambient air through higher and higher density filtration systems, add humidity to them and use that air to cool our data center," Happychuk said.

Happychuk's 3,200-square-foot data center, filled mostly with IBM System p systems, was not one of the eight that Lawrence Berkley studied, but it's a good example of a company being able to save money using air-side economizers. The company is putting the savings to a figure now. In the meantime, Happychuk said that "accounting upstairs told us that whatever we're doing, to keep doing it."

"We did it because it's cheap, and we had been talking about finally doing something green that pays back," he said.

An added bonus is that heat coming from the servers warms not only the extremely cold outside air, but also some editorial offices. When editors turn up the thermostat, baffles handling the hot air open to allow air in. When they have enough heat and turn the thermostat down, the hot air is directed instead to a warehouse that contains printing presses and storage.

Sunnyvale, Calif.-based network storage company Network Appliance Inc., (NetApp) one of the companies under the Lawrence Berkley study, said in an interview in December that using air-side economizers has probably cut cooling costs by one-third and thus far caused no problems with contaminants.

Lawrence Berkley and the study's sponsor, PG&E, hope to use the results to convince more data center shops to try air-side economizers.

Utilities are looking for ways to support data center power and cooling efficiency. The benefit to them is they don't run out of power for customers, a situation that can lead to rolling blackouts or brownouts. PG&E also offers rebates for data centers that use Sun Microsystems Inc.'s energy-friendly Niagara T1000 and T2000 servers, and for virtualization software used to consolidate servers.

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